What is claimed is:

Sub A1

~~1. A method of recovering~~ at a destination node of a packet-based telecommunications network the timing clock of a service input at a source node of said network, the destination node and the source node having a common network clock, comprising the steps of:

(a) at the source node, dividing the timing clock of the service input by a factor of an integer N to form residual time stamp (RTS) periods;

(b) at the source node, counting the network clock cycles modulo 2^P, where 2^P is less than the number of network clock cycles within an RTS period and P is chosen so that the 2^P counts uniquely and unambiguously represent the range of possible network clock cycles within an RTS period;

(c) transmitting from the source node to the destination node an RTS at the end of each RTS period that is equal to the modulo 2^P count of network clock cycles at that time;

(d) determining from the RTSs received at the destination node, the number of network clock cycles in each RTS period;

(e) generating a pulse signal from the network clock at the destination node in which the period between each pulse in the pulse signal equals the determined number of network clock cycles in the corresponding RTS period; and

(f) multiplying the frequency of the pulse signal generated in step (e) by a ~~factor of N.~~

N
P
N
K

2. The method of claim 1 wherein the network clock frequency is less than or equal to twice the service clock frequency.

Sub A2

~~3. A method of recovering at a destination node of a packet-based~~ telecommunications network the timing clock of a service input at a source node of said network, the destination node and the source node having a common network clock, comprising the steps of:

(a) at the source node, dividing the timing clock of the service input by a factor of an integer N to form residual time stamp (RTS) periods;

(b) at the source node, dividing the network clock by a rational factor to form a derived network clock;

(c) at the source node, counting the derived network clock cycles modulo 2^P, where 2^P is less than the number of derived network clock cycles within an RTS period and P is chosen so that the 2^P counts uniquely and unambiguously represent the range of ~~possible derived network clock cycles within an RTS period;~~

N
P
N
K

claim 3 > 13

N P N K

(d) transmitting from the source node to the destination node an RTS at the end of each RTS period that is equal to the modulo 2^P count of derived network clock cycles at that time;

(e) at the destination node, dividing the network clock by the same rational factor used at the source node to form a derived network clock equal to the derived network clock at the source node;

(f) determining from the RTSs received at the destination node, the number of derived network clock cycles in each RTS period;

(g) generating a pulse signal from the derived network clock at the destination node in which the period between each pulse in the pulse signal equals the determined number of derived network clock cycles in the corresponding RTS period; and

(h) multiplying the frequency of the pulse signal generated in step (g) by a factor of N.

4. The method of claim 3 wherein the derived network clock frequency is less than or equal to twice the service clock frequency.

Sub No 3

P N K

~~5. Apparatus for recovering at a destination node of a packet-based~~ telecommunications network the timing clock of a service input at a source node of said network, the destination node and the source node having a common network clock, comprising at the source node:

means for dividing the timing clock of the service input by a factor of an integer N to form residual time stamp (RTS) periods;

means for counting network clock cycles modulo 2^P, where 2^P is less than the number of network clock cycles within an RTS period and P is chosen so that the 2^P counts uniquely and unambiguously represent the range of possible network clock cycles within an RTS period; and

means for transmitting over the telecommunications network an RTS at the end of each RTS period that is equal to the modulo 2^P count of network clock pulses at that time;

and comprising at the destination node:

converting means responsive to the received RTSs and the network clock for converting the received RTSs into a pulse signal in which the periods between pulses are determined from the numbers of network clock cycles associated with those RTS counts; and

means for multiplying by a factor of N the frequency of the pulse signal ~~generated by said means for converting.~~

claim 5 > 16

6. Apparatus in accordance with claim 5 wherein the network clock frequency is less than or equal to twice the service clock frequency.

7. Apparatus in accordance with claim 5 wherein said converting means comprises:

means for sequentially storing the received RTSs;

means for counting network clock cycles modulo 2^P;

comparing means for comparing the modulo 2^P count of network clock cycles with a stored RTS and for generating a pulse each time the count of network clock cycles matches the RTS; and

gating means for gating to said multiplying means, for each sequentially received and stored RTS, the pulse produced by said comparing means that occurs after the counting means counts, starting-in-time from the previous gated pulse, a number of network clock cycles that is greater than a predetermined minimum absolute number of network clock cycles that can occur within any RTS period.

Sub A4

~~8. Apparatus for recovering at a destination node of a packet-based~~ telecommunications network the timing clock of a service input at a source node of said network, the destination node and the source node having a common network clock, comprising at the source node:

means for dividing the timing clock of the service input by a factor of an integer N to form residual time stamp (RTS) periods;

means for dividing the network clock by a rational factor to form a derived network clock;

means for counting derived network clock cycles modulo 2^P, where 2^P is less than the number of derived network clock cycles within an RTS period and P is chosen so that the 2^P counts uniquely and unambiguously represent the range of possible derived network clock cycles within an RTS period; and

means for transmitting over the telecommunications network an RTS at the end of each RTS period that is equal to the modulo 2^P count of derived network clock pulses that time;

and comprising at the destination node:

means for dividing the network clock by the same rational factor used at the source node form a derived network clock;

converting means responsive to the received RTSs and the derived network clock for converting the received RTSs into a pulse signal in which the periods between pulses are determined from the numbers of derived network clock cycles associated with those RTSs; and

N P N K

claim 8 → 19

NP NK

means for multiplying by a ~~factor of N~~ the frequency of the pulse signal generated by said converting means.

9. Apparatus in accordance with claim 8 wherein the derived network clock frequency is less than or equal to twice service clock frequency.

10. Apparatus in accordance with claim 8 wherein said converting means comprises:

P1 means for sequentially storing the received RTSs;

means for counting derived network clock cycles modulo 2^P; B

comparing means for comparing the modulo 2^P B count of derived network clock cycles with a stored RTS and for generating a pulse each time the count of derived network clock cycles matches the RTS; and

P1 gating means for gating to said multiplying means, for each sequentially received and stored RTS, the pulse produced by said comparing means that occurs after the counting means counts, starting-in-time from the previous gated pulse, a number of derived network clock cycles that is greater than a predetermined minimum absolute number of derived network clock cycles that can occur within any RTS period.

END

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